

The impact of the African Great Lakes on the regional climate in a dynamically downscaled CORDEX simulation (COSMO-CLM)

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1. Motivation

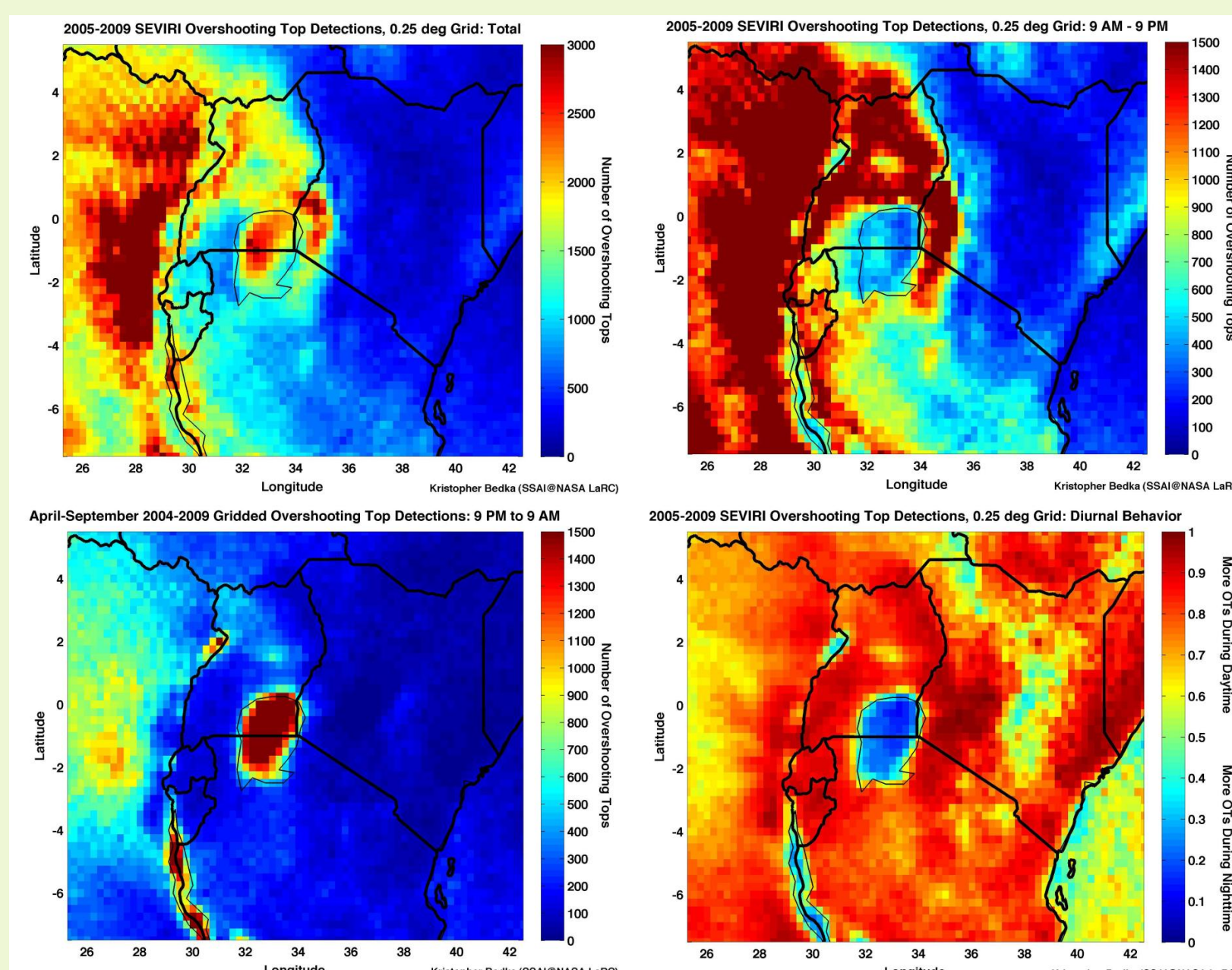


Figure 1. SEVIRI Overshooting top detections (Bedka, pers. comm.).

- severe night-time thunderstorms pose a serious threat to local fishing communities
- 5000 casualties per year estimated by local policy makers



Figure 2. Traditional fishing in Lake Kivu.

2. Setup

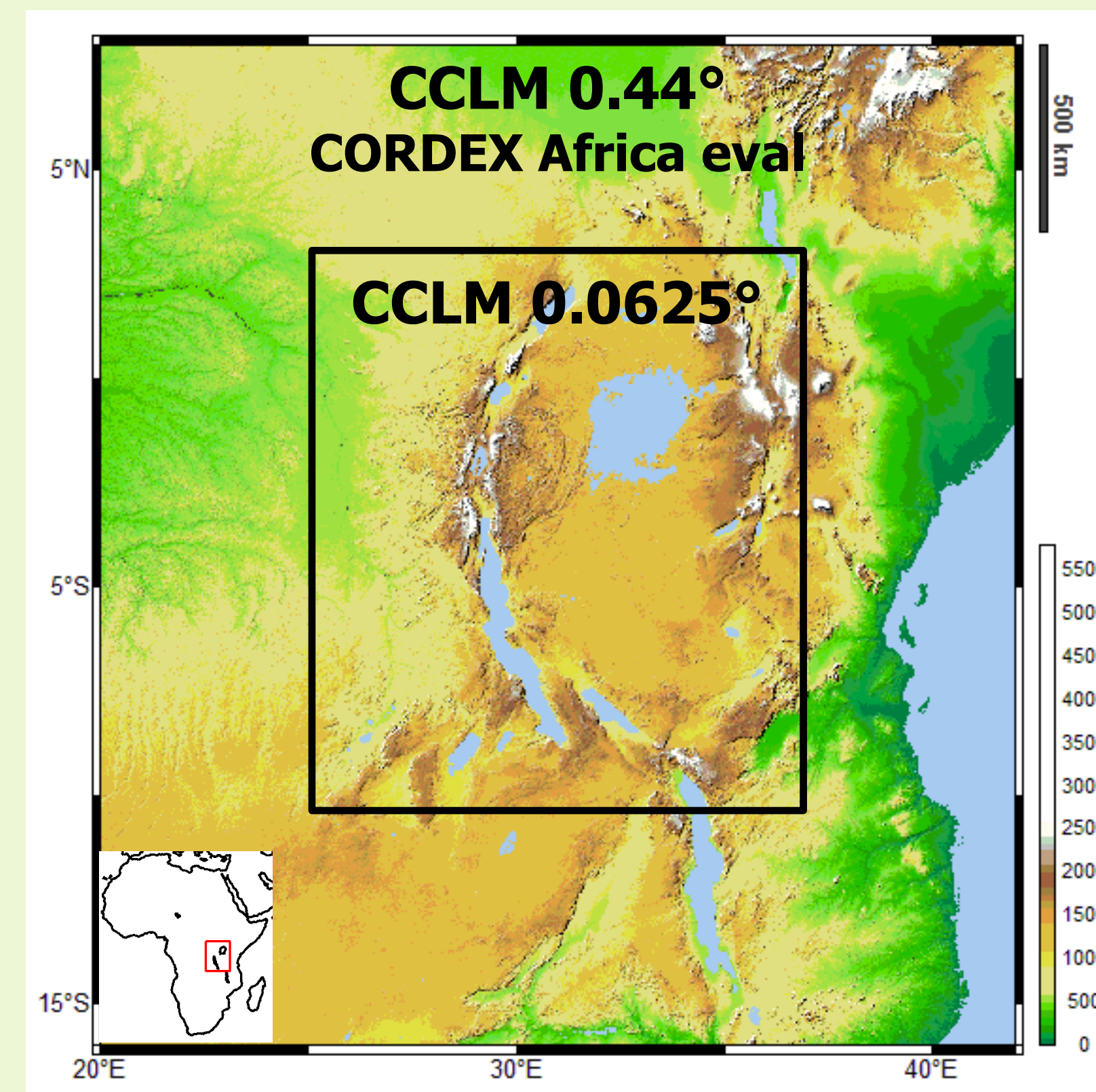


Figure 3. Nesting strategy.

- 2002
- 15 configurations tested:
 - CCLM SST → CORDEX!
 - CCLM FLake
 - CCLM² FLake
- nolakes: each lake pixel replaced by a random land pixel within 50 km radius

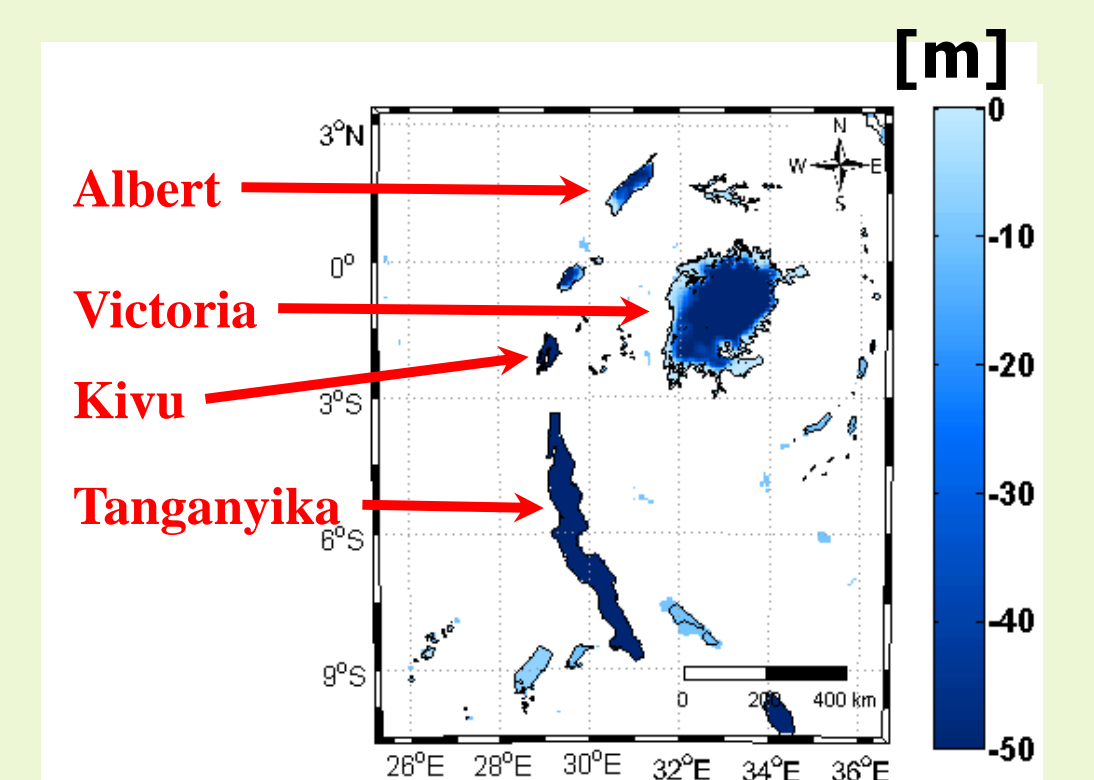


Figure 4. FLake bathymetry.

3. Model performance

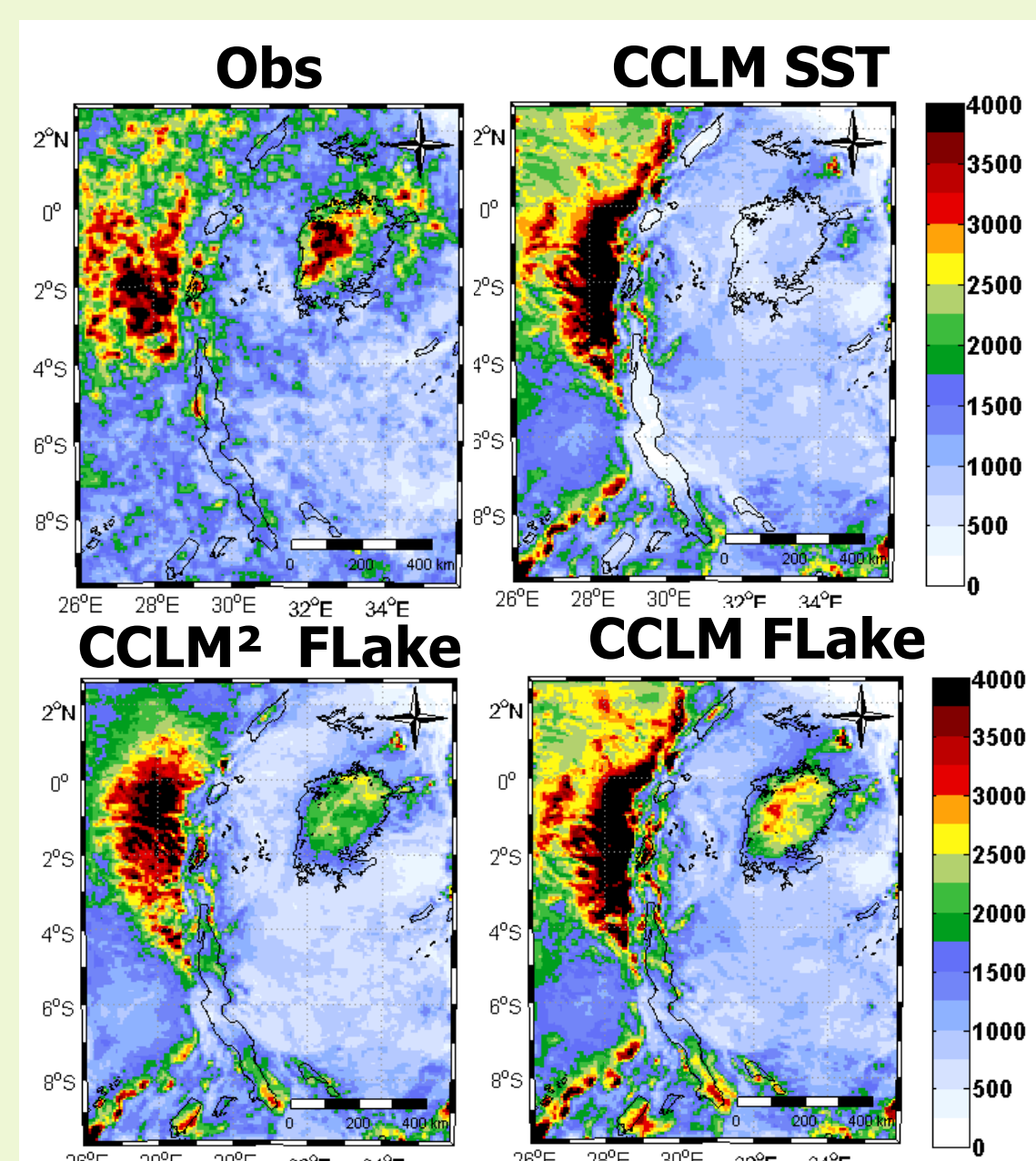


Figure 5. Evaluating precipitation using TRMM.

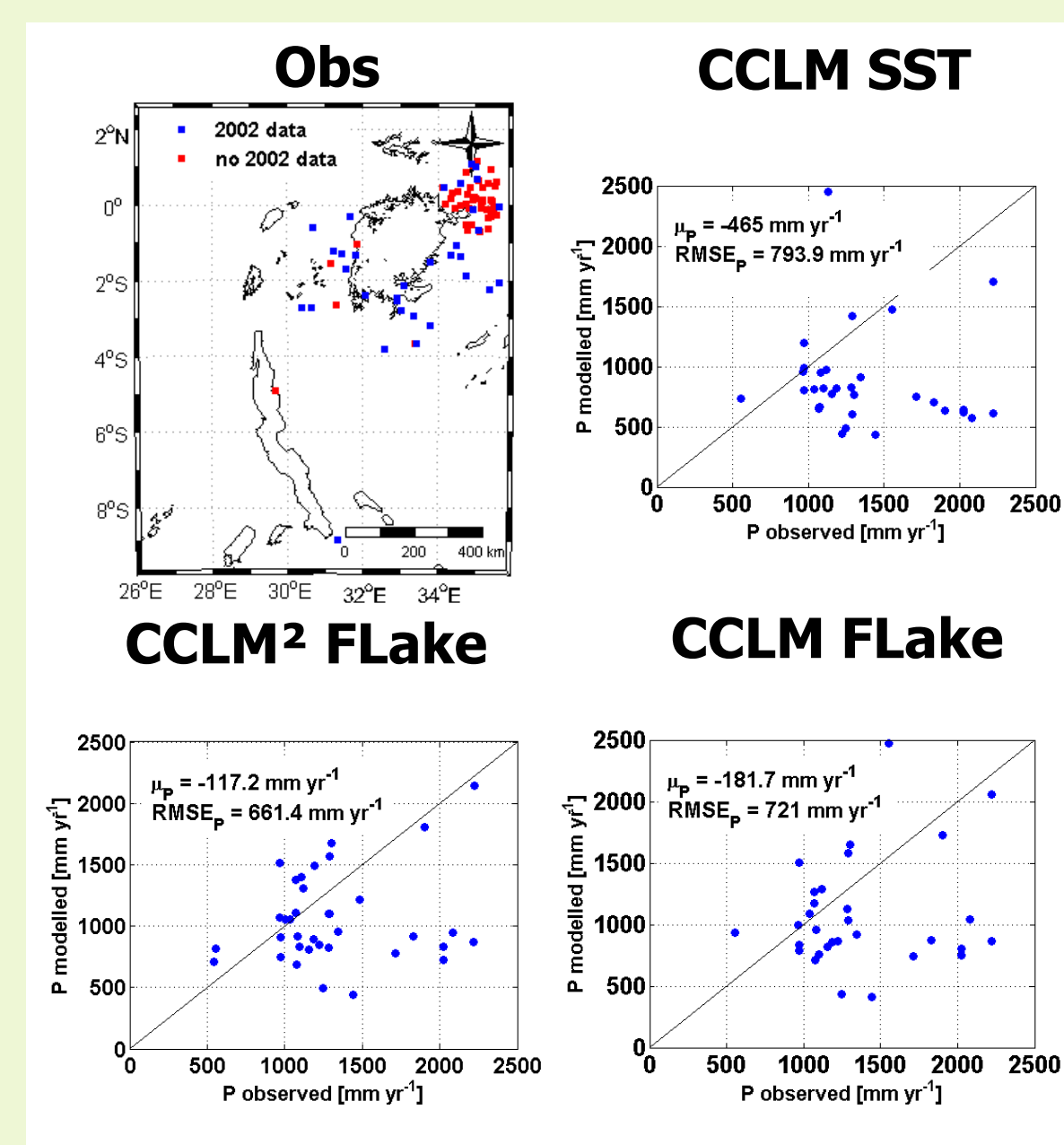


Figure 6. Evaluating precipitation using pluviometers.

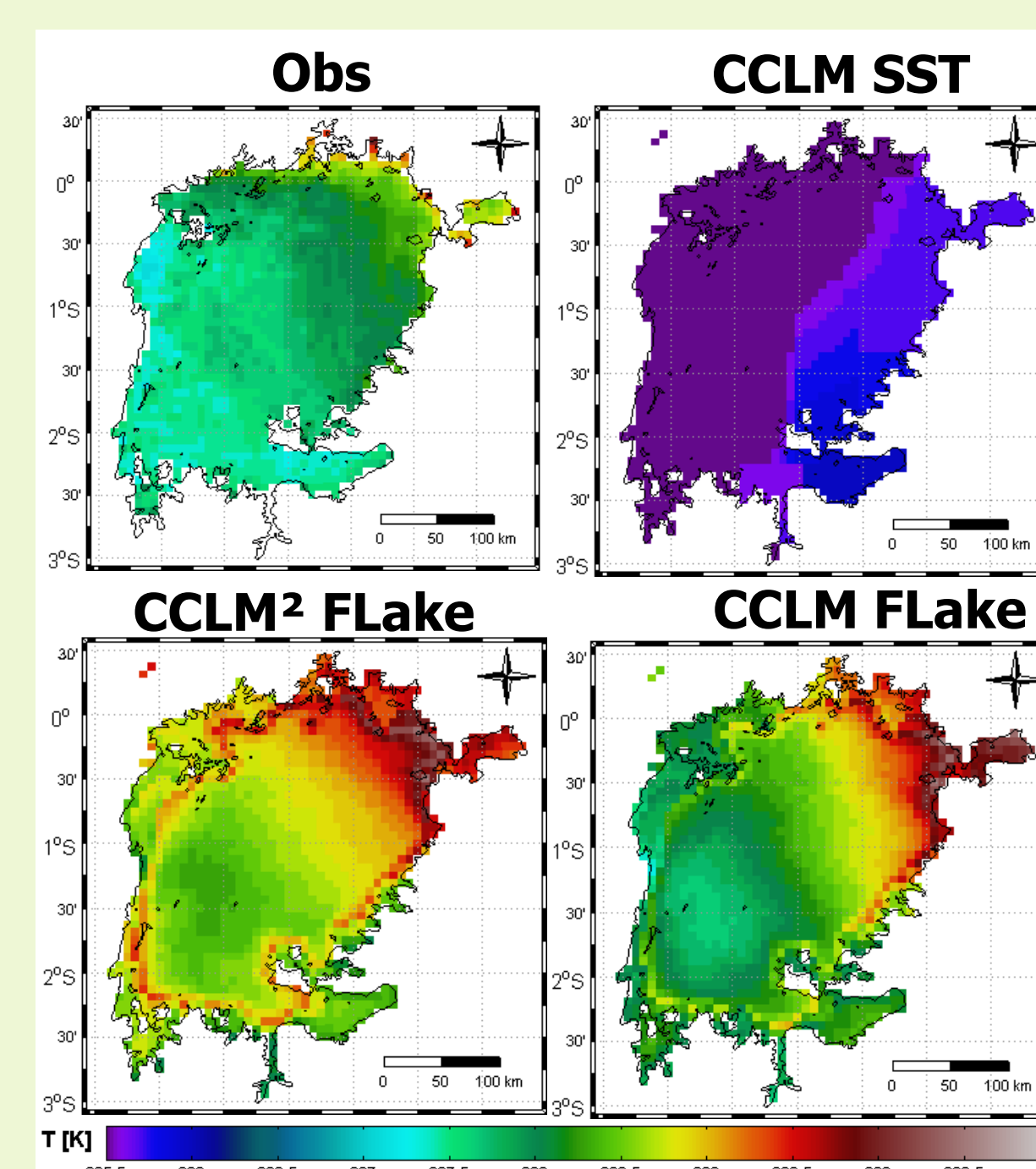


Figure 7. Evaluating lake surface temperatures using satellite data.

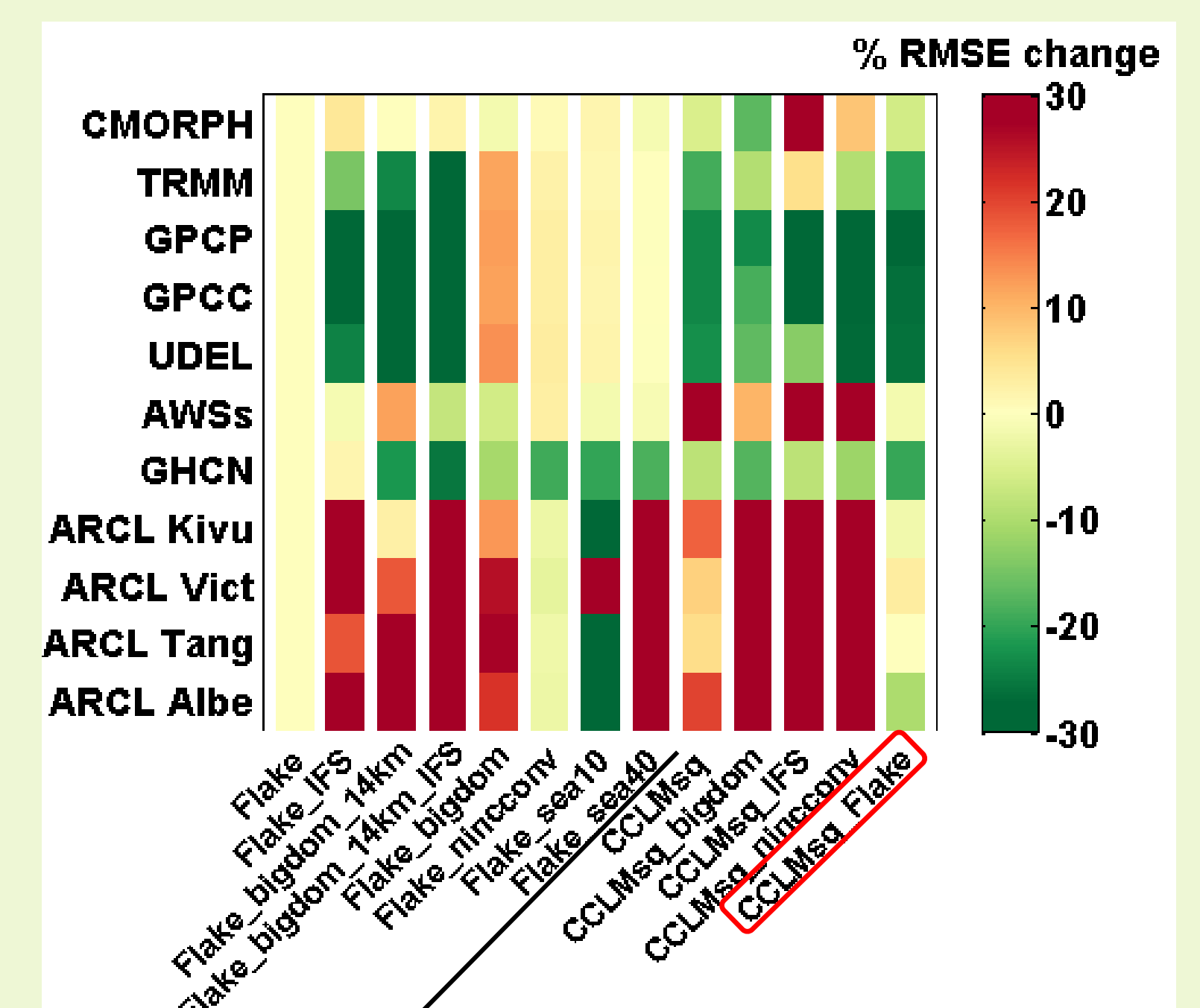


Figure 8. Systematic model evaluation.

- in contrast to CCLM FLake and CCLM² FLake, CCLM SST does not capture the enhanced precipitation over the AGLs

- using FLake cuts the bias in half relative to the default configuration!

- while CCLM SST depicts a cold bias, CCLM FLake and CCLM² FLake closely reproduce the observations

- CCLM² FLake clearly has the highest overall skill

4. Impact

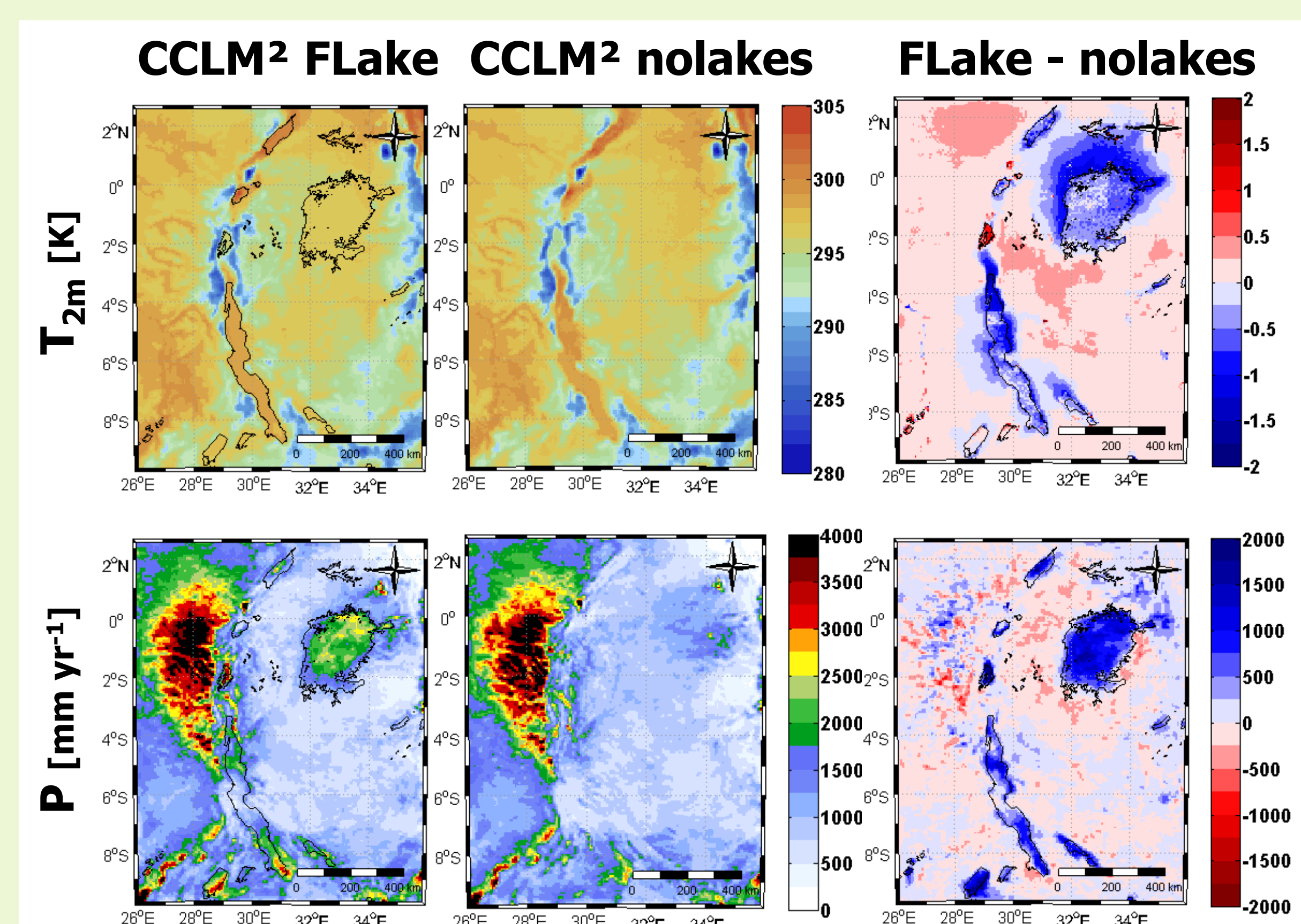


Figure 9. Impact of the AGLs on the regional climate.

- the AGLs cool the surface and generate enhanced precipitation, in both cases with pronounced spatial patterns.
- interesting exception is Lake Kivu, which calls for further investigations
- thermal inertia of the AGLs generates enhanced night-time moisture input into the boundary layer, near-surface convergence cause the lifting of these air masses

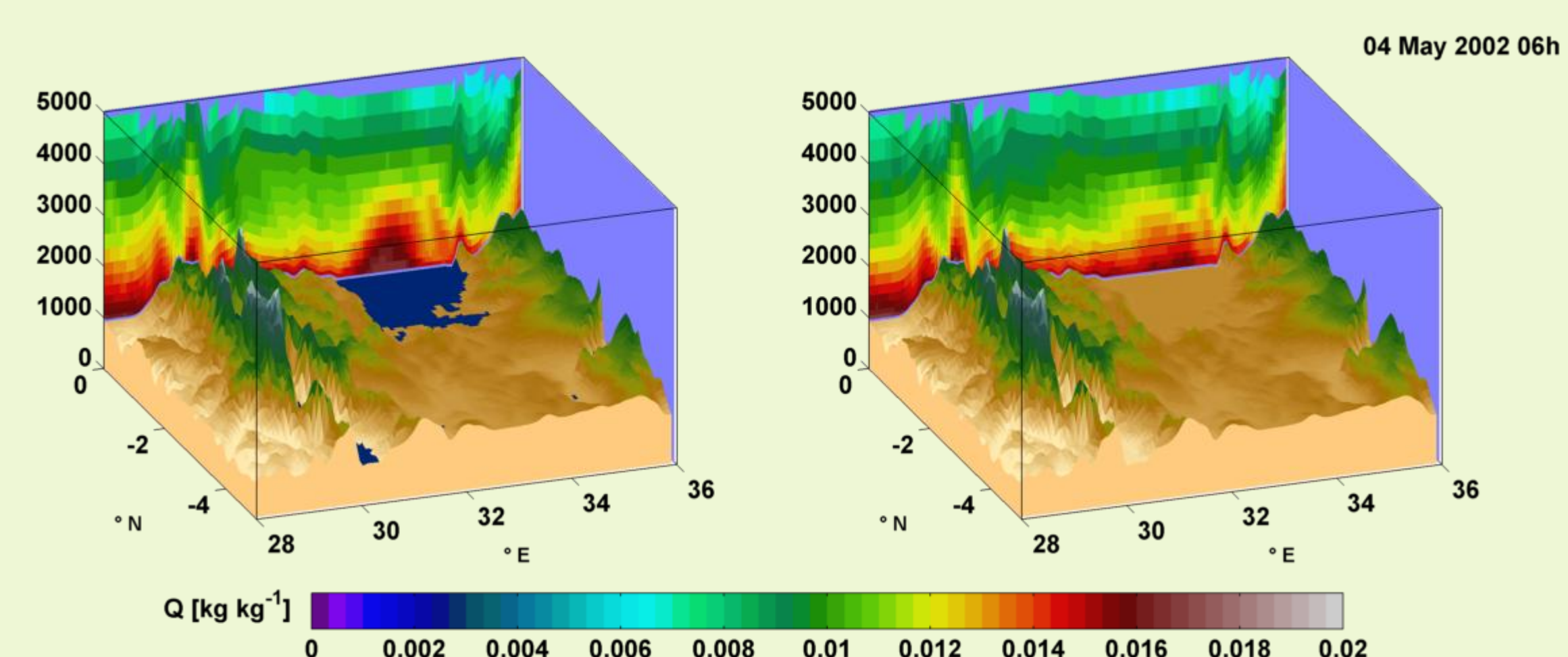


Figure 10. Total moisture content in the lower troposphere

